

In re Appln. of GRIDLEY et al.
Application No. 09/492,602

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tire casing as a result of stretching of the length of cushion gum being controlled during application;

measuring, automatically, the circumference of the tire casing;
dispensing, automatically, a length of tire tread based on the measured circumference of the tire casing, the length of tread having a first end;
adjusting the length of said tire tread so that, after being cut, the first end and a second end of the tire tread will provide a substantially continuous tread design when brought together on the casing;

cutting said length of tire tread to define the second end;
applying the cut length of tire tread to the tire casing; and
controlling the pressure applied to the tire tread during application, the pressure applied to the tread based on the circumferential distance of the casing and the cushion gum not covered by the tire tread and the length of tire tread not applied to the casing and the cushion gum;

wherein the cushion gum applying, measuring, dispensing, adjusting, cutting, tire tread applying, and controlling are performed on an integrated machine.

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24. (Amended) The method of claim 23, wherein the measuring step includes measuring the circumference of the tire casing before the cushion gum is applied to the tire casing and after the cushion gum is applied to the tire casing.

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32. (Amended) The method of claim 23 further comprising:
monitoring the circumferential distance of the casing and the cushion gum not covered by the tire tread; and
monitoring the length of tire tread not applied to the casing and the cushion gum.

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40. (Amended) An apparatus for retreading tires, comprising:
a rotatable hub for mounting a tire casing, the tire casing having a periphery;
a drive adapted to rotate the hub and casing combination to develop a tangential velocity at the periphery of the casing;
a cementless cushion gum applicator adapted to stretch a length of cushion gum onto the tire casing, the stretch being controlled during application relative to the tangential velocity of the periphery of the tire casing such that the stretched cushion gum substantially adheres to the tire casing;
a tread cutter for cutting a length of tire tread, the length of tire tread having a first end;
a tread dispenser adapted to automatically dispense the length of tire tread based on the circumference of at least one of the tire casing and the tire casing plus the cushion gum, said tread dispenser includes a tread drive adapted to permit the location of the length of tire tread to be adjustable with respect to the tread cutter for cutting the tire tread to define a second end in such a manner that, once the cut tread is applied, the design pattern of the tire tread will appear substantially continuous; and
a tread applicator adapted to apply the length of tire tread onto the cushion gum;
wherein the cushion gum applicator, the tread dispenser, the tread cutter, and the tread applicator are integrated into a single machine.

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41. (Amended) The apparatus of claim 40 further comprising:
a measuring device adapted to measure the circumference of the tire casing.

42. (Amended) The apparatus of claim 40 further comprising:
a measuring device adapted to measure the circumference of at least one of the circumference of the tire casing and the circumference of the tire casing plus the cushion gum.

43. (Amended) The apparatus of claim 40 wherein the drive is adapted to rotate the hub and casing combination at an angular rate based on the circumference of the tire casing.

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44. (Amended) The apparatus of claim 40 further comprising:
a rotatable spindle for mounting a roll of cushion gum thereon and
dispensing a length of cushion gum therefrom.

45. (Amended) The apparatus of claim 44 wherein the drive is adapted to rotate
the hub and casing combination at an angular rate based on the circumference of the tire
casing, wherein the drive is adapted to rotate the hub and casing combination at a first
angular rate, the spindle at a second angular rate, and wherein the second angular rate is
based on the first angular rate.

46. (Amended) The apparatus of claim 45 wherein the drive is adapted to rotate
the hub and casing combination such that a point on the perimeter of the tire casing has a first
tangential velocity, a point on the perimeter of the roll has a second tangential velocity, and
wherein the first tangential velocity minus the second tangential velocity provide a
nonnegative differential velocity.

47. (Amended) The apparatus of claim 46 wherein the drive is adapted such that
the differential velocity is substantially constant during application of the cushion gum.

48. (Amended) The apparatus of claim 40 further comprising:
a set of stitching rollers adapted to engage the cushion gum and provide
pressure on the cushion gum as the tire casing is rotated, thereby providing
enhanced adhesion of the cushion gum to the tire casing.

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50. (Amended) An apparatus for retreading tires, comprising:
a rotatable hub for mounting a tire casing, the tire casing having a periphery;
a cushion gum applicator adapted to apply a length of unheated cushion gum onto the tire casing, wherein said applicator dispenses said cushion gum at a rate which is less than the tangential velocity of the periphery of said tire casing to thereby stretch said cushion gum onto said tire casing;
a tread dispenser adapted to automatically dispense a length of tire tread based on the circumference of at least one of the tire casing and the tire casing plus the cushion gum;
a tread cutter for cutting the tread to define the length of tread such that the length of tread has a first end and a second end;
a track adapted to receive the length of tread from the tread dispenser and to provide the length of tire tread to the casing; and
a variable force tread applicator adapted to apply the length of tire tread onto the casing with the cushion gum disposed therebetween, wherein the variable force applicator is adapted to apply the tread to the casing with a variably controlled force that is based on the circumferential distance of the casing and cushion gum not yet covered by the tire tread and the length of tire tread not yet applied to the casing and cushion gum;
wherein the cushion gum applicator, the tread dispenser, the track, and the variable force tread applicator are integrated into a single machine.

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54. (Amended) The apparatus of claim 50 wherein the variable force tread applicator is adapted to stretch the tire tread onto the casing such that when the tire tread has been applied to the casing, the first end and the second end define a gap therebetween, the gap being within a predetermined range of distances.

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56. (Amended) The apparatus of claim 50 wherein the cushion gum applicator and the tread dispense are disposed such that the cushion gum and the tire tread are substantially aligned, and the hub is adjustable laterally in the direction of the axis of rotation of the hub to align the casing with the cushion gum and the tire tread.

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57. (Amended) The apparatus of claim 50 further comprising:
a measuring device, the measuring device adapted to measure at least one of
the circumference of the tire casing and the circumference of the tire casing plus
cushion gum.
